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10/784,199	02/24/2004	Masahiko Ito	15-046	9253

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EXAMINER	
KITOV, ZEEV V	

ART UNIT	PAPER NUMBER
2836	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/784,199	ITO, MASAHIKO	
	Examiner	Art Unit	
	Zeev Kitov	2836	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 December 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1, 3 - 10, 12 - 19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 3 - 10, 12 - 19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5)☐ Notice of Informal Patent Application
6)☐ Other: _____.

DETAILED ACTION

Examiner acknowledges a submission of the amendment and arguments filed on December 27, 2007. Claims 2 and 11 are deleted; Claims 1, 3 - 6, 10 and 12 - 14 are amended. New Claim 19 is added. A new Office Action follows.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 3 – 5, 7 - 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yaejima et al. (JP 61221674) in view of Takemoto et al. (US 5,703,412) and Tsai (US2002/0130645). Regarding Claim 1, Yaejima et al. disclose a power source; a voltage divider with two resistors (R3, R4 in Fig. 3) a voltage comparator (7 in Fig. 3) connected to the voltage divider for comparing a divided voltage with a predetermined reference voltage (Ei in Fig. 3) and for outputting a control signal when the divided voltage from the power source voltage is higher than the reference voltage, and a protecting switch (5 in Fig. 3) disposed in a circuit between the power source and the electrical circuit (load connected to output terminals in Fig. 3), the protecting switch being turned off when the control signal is supplied from the voltage comparator to the protecting switch, thereby protecting the circuit.

However, it does not disclose a voltage booster. Takemoto et al. disclose the vehicle occupant protection system having the voltage booster (Fig. 1) disposed in a circuit connecting the power source (2 in Fig. 10 and the electrical load circuit (airbag system). It further recognizes necessity to protect the electrolytic capacitor (4 in Fig. 1) against over-voltages and provides his solution to resolve the problem (by discharging capacitor trough transistor 9 in Fig. 1, col. 4, lines 35 – 59). The reference has the same problem solving area, namely providing an over-voltage protection for the electronic parts. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Yaejima et al. according to teachings of Takemoto et al. by using Yaejima overvoltage protection solution in the Takemoto et al. system because (I) the capacitor in the Takemoto et al. circuit carries the boosted high voltage and Takemoto et al. recognizes necessity to protect the capacitor against over-voltages, and (II) the capacitor in Takemoto et al. circuit carries high voltage and accumulated high value of the charge; its discharge requires use of relatively expensive high voltage and high current transistor, while in the Yaejima circuit for disconnection of the stabilized low power supply voltage (which according to Fig. 2 schematic, is lower than the battery voltage), there is no special high voltage and high current requirements. Additionally, such modification will provide extended market niche for manufacturers of the Yaejima system.

As per protecting switch functioning as a rectifying diode, Tsai et al. disclose the voltage converter (Fig. 2) protected against overvoltages by a series connected NMOS switch (209 in Fig. 2, [0027]). Even though the protected converter is not a boost-type

converter, it is irrelevant for the overvoltage protection circuit; in the boost-type converter the series connected transistor as an overvoltage protection means will work the same way. The intrinsic rectifying anti-parallel body diode is an inherent property of the MOSFET. The evidence of inherency is provided by Cheng et al. (US 5,991,171), which demonstrates the MOSFET switch (104 in Fig, 1) having the rectifying anti-parallel body diode (103 in Fig. 1, col. 2, lines n8 – 11, col. 3, lines 12 – 26. The rectifying diode does not require further modification of the previously introduced reference (Tsai et al.), since the body diode is inherent in the structure of the MOSFET switch.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Yaejima solution by replacing the bipolar transistor of Yaejima by the MOSFET according to teachings of Tsai et al., because of well known in the art advantages of the MOSFET, such as extremely low voltage drop and power dissipation across the element in ON state, extremely low gate drive current making possible controlling the transistor by CMOS logic circuits, and substantial currents it can withstand.

Regarding Claim 3, in the Yaejima et al. circuit modified according to teachings of Takemoto et al. and Tsai, the protecting switch is disposed between the power source and the voltage booster. The motivation for such placement of the protecting switch is the same as above.

As per Claims 4 and 5, they require placement of the protective switch in the voltage booster (Claim 4) or between the voltage booster and the load (Claim 5).

The criticality of such placement is not disclosed. Neither any advantage of such placement is provided. Therefore, it is considered as mere reversal of parts or integration of the protecting switch into the booster. It would have been obvious to one of ordinary skill in the art at the time the invention was made to move the protecting switch into the voltage booster, since it has been held that a mere reversal of the essential working parts of a device involves only routine skill in the art. *In re Japikse,* 181 F.2d 1019, 86 USPQ 70 (CCPA 1950). It would have been obvious to one of ordinary skill in the art at the time the invention was made to integrate the protective switch into the voltage booster, since it has been held that forming in one piece an article, which has formerly been formed in two pieces and put together involves only routine skill in the art. *In re Larson,* 340 F.2d 965, 968, 144 USPQ 347, 349 (CCPA 1965) Court stated: "the use of a one piece construction instead of the structure disclosed in [the prior art] would be merely a matter of obvious engineering choice."

Additionally regarding Claim 5, Takemoto et al. disclose placement of the protective switch (9 in Fig. 1) between the voltage booster (1 in Fig. 1) and the load. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Yaejima solution by placing the protective switch between the voltage booster and the load, because in such case the protective switch action (discharge of the protected capacitor) provides the faster and therefore better protection for the capacitor, rather than the circuit with the switch placed upstream of the voltage booster, since in such case, disconnection of the power supply from the voltage booster

does not immediately removes the high voltage from the capacitor (due to delays in the voltage booster).

Regarding Claim 7, Takemoto et al. discloses the airbag system (col. 1, lines 7 – 34). As to inflating the airbag with gas upon detection of a collision and igniting device for generating the gas, all these attributes are inherent in the modern airbag system. The Baumgartner et al. (US 6,717,289) reference is used only to demonstrate that the listed elements are inherent in the modern airbag system. Baumgartner et al. list the acceleration sensor (20 in Fig. 1) detecting the collision, igniting circuit (12 and 14 in Fig. 1) for igniting a device for generating the gas, and the electrical power supply, including battery (28 in Fig. 3 and voltage booster (40 in Fig. 1). All the listed items do not require further modification of the previously introduced reference (Takemoto et al.), since they are inherent in the structure of the airbag system. As to use of the Takemoto et al. reference to modify the primary reference (Yaejima et al.), the motivation was given above.

As per Claim 8, it requires one of the resistors of the voltage divider being variable resistor. Yaejima discloses the variable potentiometer (VR1 in Fig. 3) though used for different purpose. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Yaejima solution by making one of two separate resistors of the voltage divider variable, because according to Court Decision *In re Stevens,* 212 F.2d 197, 101 USPQ 284 (CCPA 1954), the court held that adjustability, where needed, is not a patentable advance.

Regarding Claim 9, Yaejima discloses a reference voltage source (E1 in Fig. 3) providing the reference voltage.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yaejima et al. in view of Takemoto et al., Tsai and Harshe (US 5,563,002). As per Claim 10, it differs from Claim 9 rejected above by its limitation of the reference voltage source being a variable voltage battery. Yaejima et al. disclose the variable voltage source shown as a battery (E1 in Fig. 1). Harshe discloses the structure of the variable voltage battery (see Abstract). An advantage of the variable voltage battery over other methods of providing variable voltage is in its schematic simplicity (col. 1, lines 10 – 52). Since the variable voltage battery is a functional equivalent to other variable voltage sources such as resistive voltage divider it is simple substitution of one known equivalent element for another to obtain predictable results. It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the variable voltage source such as potentiometer by the variable voltage battery since the substitution of one known element for another functionally equivalent element would have yielded predictable results.

Claims 6, and 12 - 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yaejima et al. in view of Takemoto et al., Baldwin et al. (US 6,859,020) and Tsai et al. (US2002/0130645). As per claim 6, it differs from Claim 1 rejected above by its limitation of a voltage booster and a protecting switch disposed in a voltage booster.

Takemoto et al. disclose the vehicle occupant protection system having the voltage booster (Fig. 1) disposed in a circuit connecting the power source (2 in Fig. 10 and the electrical load circuit (airbag system). It further recognizes necessity to protect the electrolytic capacitor (4 in Fig. 1) against over-voltages. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Yaejima et al. according to teachings of Takemoto et al. by using Yaejima overvoltage protection solution in the Takemoto et al. system because (I) the capacitor in the Takemoto et al. circuit carries the boosted high voltage and Takemoto et al. recognizes necessity to protect the capacitor against over-voltages, and (II) the capacitor in Takemoto et al. circuit carries high voltage and accumulated high value of the charge; its discharge requires use of relatively expensive high voltage and high current transistor, while in the Yaejima circuit for disconnection of the stabilized low power supply voltage (which according to Fig. 2 schematic, is lower than the battery voltage), there is no special high voltage and high current requirements. Additionally, such modification will provide extended market niche for manufacturers of the Yaejima system.

Claim 6 further requires placement of the protective switch in the voltage booster. The criticality of such placement is not disclosed. Neither any advantage of such placement is provided. Therefore, it is considered as mere reversal of parts or integration of the protecting switch into the booster. It would have been obvious to one of ordinary skill in the art at the time the invention was made to move the protecting switch into the voltage booster, since it has been held that a mere reversal of the

essential working parts of a device involves only routine skill in the art. *In re Japikse,* 181 F.2d 1019, 86 USPQ 70 (CCPA 1950). It would have been obvious to one of ordinary skill in the art at the time the invention was made to integrate the protective switch into the voltage booster, since it has been held that forming in one piece an article, which has formerly been formed in two pieces and put together involves only routine skill in the art. *In re Larson,* 340 F.2d 965, 968, 144 USPQ 347, 349 (CCPA 1965) Court stated: "the use of a one piece construction instead of the structure disclosed in [the prior art] would be merely a matter of obvious engineering choice." However, Takemoto does not disclose schematic details of the voltage booster circuit. Baldwin et al. disclose the switching voltage converter (Fig. 3 and 4) capable of working in both buck and boost regimes (col. 6, lines 18 – 22) and boosting the source voltage to a predetermined level (since it is a voltage regulator, col. 1, lines 11 – 13) having a booster coil (L in Fig. 3 and 4), booster switches (T1, T2 and T3 in Fig. 3 and 4) for switching current flowing through the booster coil at a high speed. Switching the current flowing through the booster coil at the high speed is inherent in the concept of switching power supply, according to which the inductor should be switched at frequency high enough to maintain substantially constant voltage (current) in the load. If the frequency were not high enough, substantial ripples in the load voltage would jeopardize the load functioning. It further discloses the rectifying diode (Dp in Fig. 4) for allowing current to flow only in one direction from the coil to the electrical circuit. The Baldwin reference is used only to demonstrate that the presence of the booster coil, the booster switch, and

the rectifying diode is inherent in the schematic structure of the booster circuit. No modification of the Takemoto reference is necessary.

As per protecting switch functioning as a rectifying diode, Tsai et al. disclose the voltage converter (Fig. 2) protected against overvoltages by a series connected NMOS switch (209 in Fig. 2, [0027]). Even though the protected converter is not a boost-type converter, it is irrelevant for the overvoltage protection circuit; in the boost-type converter the series connected transistor as an overvoltage protection means will work the same way. The intrinsic rectifying anti-parallel body diode is an inherent property of the MOSFET. The evidence of inherency is provided by Cheng et al. (US 5,991,171), which demonstrates the MOSFET switch (104 in Fig, 1) having the rectifying anti-parallel body diode (103 in Fig. 1, col. 2, lines n8 – 11, col. 3, lines 12 – 26. The rectifying diode of Cheng et al. does not require further modification of the previously introduced reference (Tsai et al.), since the body diode is inherent in the structure of the MOSFET switch.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Yaejima solution by replacing the bipolar transistor of Yaejima by the MOSFET according to teachings of Tsai et al., because of well known in the art advantages of the MOSFET, such as extremely low voltage drop and power dissipation across the element in ON state, extremely low gate drive current making possible controlling the transistor by CMOS logic circuits, and substantial currents it can withstand.

Regarding Claim 12, Tsai discloses the overvoltage-protecting switch (209 in Fig. 2) being positioned between the power source (Vin in Fig. 2) and the voltage converter. In the Balldwin et al. circuit modified according to teachings of Tsai et al. the overvoltage-protecting switch (209 in Fig. 2) is being positioned between the power source (Vin in Fig. 2) and the voltage booster. A motivation for modification of the reference is the same as above.

Regarding Claim 13 and 14, as was stated above (see Claim 6 rejection), in the Baldwin et al. circuit modified according to teachings of Tsai et al. the overvoltage-protecting switch (209 in Fig. 2) is being positioned between the power source (Vin in Fig. 2) and the voltage booster. As to positioning the overvoltage-protecting switch in the voltage booster, it is clear from the Specification that the overvoltage-protecting switch functions the same way, i.e. disconnects the power supply when the input power supply exceeds the threshold. Applicant did not disclose any advantage of such placing. There is no apparent advantage in placing the overvoltage-protecting switch according Claims 13 and 14 in comparison to Claim 12, since the disconnection of the switch is still controlled by the input voltage. Therefore, modification of Claims 13 and 14 would not modify the operation of the device and is therefore, is considered as rearrangement of parts. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Yejima et al. and Baldwin solutions by moving the overvolatge-protecting switch to a new position inside the boost converter, because according to Court Decision *In re Japikse*, 181 F.2d 1019, 86 USPQ 70 (CCPA 1950),

moving the switch to a new position were held unpatentable because shifting the position of the starting switch would not have modified the operation of the device.

Additionally regarding Claim 14, Takemoto et al. disclose placement of the protective switch (9 in Fig. 1) between the voltage booster (1 in Fig. 1) and the load. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Yaejima solution by placing the protective switch between the voltage booster and the load, because in such case the protective switch action (discharge of the protected capacitor) provides the faster and therefore better protection for the capacitor, rather than the circuit with the switch placed upstream of the voltage booster, since in such case, disconnection of the power supply from the voltage booster does not immediately removes the high voltage from the capacitor (due to delays in the voltage booster).

As per Claim 15, it differs from Claim 6 rejected above by its limitation of the power supply circuit being used in the airbag vehicle system. Takemoto et al. disclose the power supply unit used in the passenger protecting airbag system (col. 1, lines 7 – 15). As to particular details of the airbag system action, such as inflating the airbag with gas upon detection of a collision and a use of the igniting circuit for igniting a device, they all are inherent steps and parts in a modern airbag system. The Baumgartner et al. (US 6,717,289) reference is used only to demonstrate that the listed elements are inherent in the modern airbag system. Baumgartner et al. list the acceleration sensor (20 in Fig. 1) detecting the collision, igniting circuit (12 and 14 in Fig. 1) for igniting a device for generating the gas, and the electrical power supply, including battery (28 in

Fig. 3 and voltage booster (40 in Fig. 1). All the listed items do not require further modification of the previously introduced reference (Takemoto et al.), since they are inherent in the structure of the airbag system. As to use of the Takemoto et al. reference to modify the primary reference (Yaejima), the motivation was given above.

Regarding Claim 16, Yaejima discloses use of the variable resistor as a voltage sensor for firing the SCR (10 in Fig. 3) It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the resistive divider of Yaejima (R3 and R4 in Fig. 3) by replacing them with the potentiometer (VR1 in Fig. 3), because according to Court Decision *In re Stevens,* 212 F.2d 197, 101 USPQ 284 (CCPA 1954), the court held that adjustability, where needed, is not a patentable advance.

Regarding Claim 17, Yaejima discloses the reference voltage source (E1 in Fig. 3).

Regarding Claim 18, Yaejima discloses the reference voltage source (E1 in Fig. 3) as being variable voltage source.

Regarding Claim 19, Baldwin et al. disclose the voltage ebooster including a booster coil (L in Fig. 3 and 4)

Response to Arguments

Applicant's Arguments have been given careful consideration. Some of the arguments are now moot in view of new ground(s) of rejection. The other Arguments have been found non-convincing.

Applicant argues that MOSFET switch of Tsai et al. does not have a rectifying diode even though it was stated in the previous Office Action that the body diode is inherent in the structure of MOSFET switch. In the current Office Action this inherency is additionally supported by the evidence, Cheng et al., demonstrating presence of the MOSFET body diode and its use for rectification purpose.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zeev Kitov whose current telephone number is (571) 272 - 2052. The examiner can normally be reached on 8:00 – 4:30. If attempts to reach examiner by telephone are unsuccessful, the examiner's supervisor, Michael Sherry, can be reached on (571) 272 – 2800, Ext. 36. The fax phone number for organization where this application or proceedings is assigned is (571) 273-8300 for all communications.

Z.K.,
1/15/2008

1/17/08

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